RESEARCH ARTICLE

Advanced Science Letters
Vol. 23, 11884–11888, 2017

The Ammoniation—A Way for Evolving the Rural Areas, Madura Island, Indonesia

Soedarto Teguh[1,*], Soemartono[1], Syaifuddin Zuhri[2], and Ertien Rining[2]

[1]*Faculty of Agriculture, University of Pembangunan Nasional "Veteran" East Java, 60294, Indonesia*
[2]*Faculty of Social and Development Science, University of Pembangunan Nasional "Veteran" East Java, 60294, Indonesia*

Like other developing countries, Indonesia faces one of the biggest challenge for it's development. The underdeveloped regions is still being a main challenge for the development of many countries likewise in Indonesia. The food security is one of the trusted alternative ways to empower the rural region society in order that the development of the country could be held. Ammoniation is one of alternative ways to empower the rural region society. This way will be used for the quality enhancement of their cattle. The purpose of the study is to formulate and implement a model of empowerment of the people in underdeveloped regions based on local resource potential by implementing Ammoniation in an effort to improve the welfare of people in underdeveloped regions. This research target is the people in underdeveloped regions in Madura island, Indonesia, which is identified as rural area. The approach or methodology used in this study is a synergistic approach by government institutions, religious and profession with the mechanism of Participatory Rural Appraisal (PRA). Strategic efforts to empower communities can be pursued in synergy through the potential development of local models.

Keywords: Ammoniation, Human Development, Economic Development, Rural, Regional Economics.

1. INTRODUCTION

Indonesia is one of the countries which has many islands. It is got a designation as the world's largest island country with more than seventeen thousand islands. Indonesia has 34 provinces which have many differentiation like ethnic, art, culture, language, norm and many more. In this study, we will focuss on one of the well-known islands in Indonesia which is called Madura Island and more specific in its one of region called Bangkalan.

Bangkalan is one area that is located on the island of Madura in East Java province has an area of 1260.14 km^2. Geographically its position is between 112°40′06″–113°08′04″ East and 6°51–7°11′39″ south latitude bounded by the north side of Java Sea, Sampang, Madura as the boundary. Bangkalan area from the topography is at an altitude of 2–100 m above sea level. Those areas have a height between 2–10 m above sea level whilst other regions located in the central part have a height of 19–100 m above sea level. The highest district is Geger with a height of 100 m above sea level.

Bangkalan has Monsoon climate type with two rainy seasons, which took place between November–April and dry between May to October. Topographic conditions, in addition to df sasMonsoon winds affect the amount of rainfall, the higher the location above sea level, the greater the rainfall when compared to plain areas. The middle part of the research area is hills and mountains, then rainfall is much greater than the rainfall in the plains which is the beach, both in the north and in the south. Rainfall in hilly areas even more than 2000 mm/yr; which contributes significantly for the water infiltration into the soil, while in coastal areas rainfall ranging between 500–1000 mm/yr. Bangkalan administration area consist of 18 districts and 281 villages with a total area: 1,260.24 km^2. Judging from the composition of the village, Tanah Merah has the largest number of villages, include 23 villages, while the least Distric is Kamal as many as 10 villages Bangkalan regency administration area.

The rate of population growth in Bangkalan centipede is located in the District of Bangkalan City. Interval of the past three years the highest growth rate for the years 2008–2010 because at that time the transport route Surabaya-Sampang-Pamekasan and Sumenep passes subdistrict Bangkalan as Suramadu bridge is created. With the result that many people in other districts move to the town to look for work because there is seen that these districts more the outlook in terms of economy.

There are three important components of national security, namely (1) economic instruments, where the underdeveloped regions with a wealth of natural resources need to be well managed so as to improve their welfare. The impoverished societies will have a pride in being the nation Indonesia and willing to sacrifice for the nation. (2) The instrument of human resources, and (3) the technology Instruments. The Development for the society well-being can not be realized without the technology in managing natural resources, building infrastructure and information

*Author to whom correspondence should be addressed.

 1936-6612/2017/23/11884/005 doi:10.1166/asl.2017.10537

technology systems that support the defense. The Independence in the field of technology impact on impoverished communities deterrence against external threats.

The empowerment of Indonesian society in large part directed at regions classified as underdeveloped regions. Underdeveloped regions is the district that the community and the region is relatively underdeveloped than other regions on a national scale. The determination of underdeveloped regions using the approach of six basic criteria are: economy, society, human resources, infrastructure, local financial ability (fiscal gap), accessibility, and regional characteristics.[1]

1.1. Poor Families in Bangkalan

Bangkalan island has many enough poor families. According to the data of poor families from Office Enableness of Women and Family Planning of Bangkalan Regency, the total of poor families in Bangkalan is 250,825 householders. From this fact, we are able to see that Bangkalan, Madura Is one of the regions in Indonesia that need to be empowered.

Beside its facts, Bangkalan has diverse use of land. Based on the use of land, the agricultural areas in the district of Bangkalan divisible into agricultural fields, and upland (rainfed). Field, agricultural areas of this type in Bangkalan prevalent in the northern region, especially in the districts Burneh, Tanjung Bumi, Arosbaya and partly in District Socah. With increasing change in the function of agricultural land into the the development of the region, then to maintain the area of agriculture, especially technical irrigated rice land and perennial food crops (paddy eternal) need to be improved. Moor land is the use of the land area that has the largest part in Bangkalan. The existence of the region in Bangkalan spread throughout the district, especially in areas that lack of water and rely on rain water (rainfed), where for the increase in the value of benefits is done through the application of the system of rotation, intercropping and so forth.

Dry land area in Bangkalan reach 77,999.63 hectares spread in each district. Most dry land are in the district Modung with 5,580.07 ha, while the smallest one is in the district of Bangkalan (279.74 Ha). The dry land can be classified into three parts, namely high, medium and low. Plantations in Bangkalan just mix plantation and some of plantation types such as of coconut, cashew, palm, areca nut, chilli herbs and so on. The development of extensive plantations with the best way is qualitative growth in belindo which is contained in plant species, and the opposite happened in sugarcane. The area of the smallest found on any type of clover that land is not more than 11 Ha. If the evaluation of the average amount of production is most present in plant species whose area is most like a coconut.

1.2. Population and Employment in Bangkalan

The population in Bangkalan is as many as 906,761 people (2011 Census), consisting of 433,206 inhabitants approximately 47.75% male population and 473,555 inhabitants approximately 52.25% women. While the population density of 4.24 people/household. Bangkalan residents Sex Ratio is at 91.48%, which means that at every 100 females there were 91 men while the dependency ratio (Dependency Ratio) which is of childbearing age (ages 15 to 64 years) who had to bear the burden of dependence as much as 56.59% of non-productive population/age 0 to 14 years of age or over 65 years of age. Based on the statistical data can be argued that in fact the majority of the population Bangkalan is female.

Table I. The number of poor family in Bangkalan.

No	Subdistrict	Household total
1	Kamal	11,219
2	Labang	10,838
3	Kwanyar	14,085
4	Modung	12,903
5	Blega	16,238
6	Konang	11,164
7	Galis	17,867
8	Tanah Merah	17,344
9	Tragah	8,003
10	Socah	15,451
11	Bangkalan	18,303
12	Burneh	12,875
13	Arosbaya	11,409
14	Geger	18,415
15	Kokop	12,361
16	Tanjung Bumi	13,797
17	Sepulu	12,175
18	Klampis	16,378
	Total	250,825

The following data shows that most of the livelihood chosen by society in Bangkalan is agriculture. In general, workers absorbed in the agricultural sector is large enough that 550,475 people in 2010. This is because the industry with medium and large scale has not been enough in Bangkalan, so in addition absorbed in small businesses, many workers absorbed in the agricultural sector though with the salary or wages relatively low. Along with the growth of the service sector and trade, then a lot of manpower is absorbed by that sector.

The phenomenon in Bangkalan Region shows that the higher the education, the higher the unemployment rate. This condition happens due to the fact that Madura regions generally and Bangkalan in particularly, there are not too many medium or large industries that are able to pay workers with the level of fresh graduates, with the result that many graduates from senior and junior high school are absorbed in the small industrial sector. The biggest employment opportunity is the agricultural sector, although it has a tendency to decrease from 2012 to 2011. This was caused by the decline in agricultural land due to land conversion into industrial and other functions. Reduced employment in the agricultural sector, followed by an increase in employment in the industrial sector, transport and services. In general it can be concluded that in Bangkalan structure changes the pattern of employment from the agricultural sector beginning to shift slowly into industry and services sectors.

1.3. Cattle in Bangkalan

The comparison of the number of cows and buffalos in Bangkalan Region in 2011 and 2013. According to the data from Indonesian government, the population of cows and buffalos in Bangkalan result 194,869. Meanwhile, the results of the agricultural census 2013, the population reached 183,406 cows and buffalos.

1.4. Cattle Feed

Cattle Feed is one of the important things in the cattle maintenance. One of the crucial things for defining the quality of

Table II. The distribution of workers in Bangkalan.

No	Livelihood	The number of workers		
		2010	2011	2012
1	Agriculture	n.a.	550,475	n.a.
2	Mining or quarrying	n.a.	67,190	n.a.
3	Industry	n.a.	n.a.	n.a.
4	Water electricity and gas	n.a.	n.a.	n.a.
5	Building	n.a.	n.a.	n.a.
6	Trading	n.a.	99,531	n.a.
7	Transport or communications	n.a.	20,840	n.a.
8	Service	n.a.	84,221	n.a.
9	More	n.a.	95,242	n.a.

the cattle is the feed. Some articles which have a correlation with cattle feed are seemed give much benefit for the cattle feed sustainability.[8] Other researches talked about the effect of salt in drinking water and feed on animal health and meat quality or quantity has received scientific scrutiny[9, 10] but some of other are identified with limited success.[11]

Another similar topic but it is in the different concentration like how to minimize the problem associated with mycotoxin contaminated animal feed.[12] The impact of mycotoxin contamination is still being debatable. Some researchers conveyed about the contamination of mycotoxin in human health[12–14] and the other conveyed about the impact of those item on animal health and production. Besides its problem, mycotoxin is one of tools for making the poor empowered because it produces economic benefit.

1.5. Participatory Planning

The concept of empowerment itself basically refers to the theory of development where there are two levels of modernist concept that are modernist adherents with their concept of state-center development and the populist adherents with their people-center development concept. Participatory planning is one of the tools that are believed capable of delivering better results in the planning process.[2, 3] This occurs because in the process of planning, participatory planning will be able to increase the activity of greater participation among the current members. In another study mentioned that participatory planning can also be used for the evaluation of interaction possibilities being more complex in terms of participation.[4, 5]

Public participation in development is a matter that is considered very important. In the study which focuses on the context of environmental governance was also identified using one of the analysis tools such as PPGIS (the public participatory geographic information system).[6] They added that a government which is also defined as the changing "state-society" relationships, which include government agencies or private organizations (for profit and non-profit institutions) are two parallel institutions within a government.[7] In practice, the transformation of government requires not only the authority inheritance from the government sector to the private sector, but also the involvement of the society in the decision making process.[6]

Table III. The number of cows and buffalos.

Subdistrict	2011	2013
Kamal	4.612	3.596
Labang	4.655	3.835
Kwanyar	4.778	4.339
Modung	13.666	13.727
Blega	10.972	11.663
Konang	13.944	12.230
Galis	19.336	19.656
Tanah Merah	13.175	11.695
Tragah	4.984	4.105
Socah	7.183	5.978
Bangkalan	2.159	1.667
Burneh	6.861	5.886
Arosbaya	6.478	6.146
Geger	22.514	19.874
Kokop	20.186	22.938
Tanjung Bumi	13.218	12.294
Sepulu	12.040	10.407
Klampis	14.108	13.370
Bangkalan	194.869	183.406

Table IV. Potential local fodder in Bangkalan, Madura.

No	Potential local fodder	Example
1	Forage fresh	Superior grass and leaves.
2	Agricultural waste	Rice straw, peanut shells peanut meal, and so on
3	The industrial waste	Cassava pulp, pulp, molasses or cane, and so on

2. RESEARCH METHODOLOGY

The research methodology of this study is synergistically through government, religious and professional institutions with Participatory Rural Appraisal (PRA) mechanisms. The implementation processes of these activities cover:

(1) The socialization done by the research team of the community development model in underdeveloped regions which is based potential on local stakeholders,
(2) The model implementation of the empowerment through involving all stakeholders,
(3) Evaluation and social intervention to ensure policies sustainability and models of the empowerment to improve people welfare in the underdeveloped regions.

Synergism empowerment consists of the central government (Higher Education), local government (provincial, district, subdistrict), local communities and colleges (UPN "Veteran" Java) as an agent and the driving force.

The empowerment keyword lies in improving the welfare of both in the economic, social and technical. To obtain the accuracy of the data in this study using a survey method. Data collected in the form of primary and secondary data. Primary data were obtained based on the observation of in-depth interviews and structured interviews that had been prepared previously to individuals, communities and other stakeholders (local government, local community leaders).

Data were then discussed in the group discussion (FGD) is participatory, transect, observational and deep between teams of researchers and informants. This activity is expected to obtain a general overview of the condition of society in a comprehensive manner, potential, problems and constraints as well as alternative solutions according to the needs of society itself. The procedures used in primary data collection are researcher reality. The interpretation only records information corresponding to information obtained by investigators as far as possibly avoided. The new

interpretation is done when the data analysis and focus group discussions. Secondary data can be obtained from the relevant agencies.

3. RESULT

Bangkalan, Madura is an agricultural area, which is potentially most of them such as livestock sector and agriculture in general, it is spreaded evenly. The potential of the farm includes large livestock (cattle and buffalo), small livestock (goats and sheep), poultry (free-range chicken, chicken laying hens and broilers), livestock hobby (bird ocean, etc.). The development of the potential farms supported by the availability of animal feed ingredients in the form of agricultural and industrial waste (Agriculture and Livestock Bangkalan).

Feeding problems can be solved with creative thinking and trying to explore all the potential that exists to exploit the potential of local feed for livestock feed. Local feed of course must meet both criteria in terms of aspects of nutrition, economic, social, cultural, and must also pay attention to the level of sustainability so that it can be a source of feed materials continues to be available, inexpensive, readily available, non-polluting, and still in accordance with the culture of the people, so it's easy to be accepted among the community.

3.1. Feed Industry Circumstances

Livestock is more developed, when in the determination of the source and type of feed material composition is maintained. Procurement forage and concentrates to be used in the fattening process should be determined from the beginning, whether to use the resources from outside the location or working on his own. If the available land allows, better forage procurement conducted themselves with how to plant it. Planting forage must take into account the needs of the cows that will be fattened and forage production capacity are concerned.

Planting forage alone will increase the need for labor to plant, maintain and harvest the forage. If the feed material is sought from outside the location, price and mileage factor source to the location should be considered. To feed material in the form of concentrate is more economical use of resources from the outside, and is sought to obtain any materials that the availability is guaranteed throughout the year with an affordable price level and economically profitable. Determining the type of feed material is utmost importance, because it is closely related to the availability of the feed ingredients location fattening. The high availability of feeds makes farmers easier to obtain feed materials needed at a relatively cheap price. If the location of the fattening rice is the production centers, the use of rice straw to be considered, similarly, with the use of sugar cane tops in sugar cane plantations.

3.2. Feed Variations

Forage or fodder are all materials given to cattle in the form of a mixture of organic and inorganic materials to support and meet the needs of food substances for function and livestock production that is manifested in the form of growth, development and reproduction. One objective of the livestock industry is to convert food into livestock products which can be used by human. To be able to produce, cattle should receive enough nutrients to nourish the body. Judging from the economic aspect, the feed is very strategic role on the farm, because the cost of feed could reach 70% of the cost of production. If the low cost foodstuff usually is a material that is not consumed by humans and readily available in the area. Food sustances are the nutrients contained in the food needed to live cattle, produce, and reproduce. Nutrients are: water, carbohydrates, proteins, fats, vitamins, and minerals. So feed is one factor that must be considered in the livestock business. The other factors are the calves, stables, livestock disease, and crop wastes. The preservation of animal feed ingredients can be done in many ways. a way that is considered as important tool is.

3.2.1. The Ammoniation

Ammoniation is the reform process of the hard structures becoming soft structure and the addition of the element by using gas (NH_3) of urea to increase the quality of waste straw. Methods:

1. Put the whole straw into the silo gradually while being trampled to become solid.
2. Make a solution in a bucket of 400 liters of water with 60 kg urea entering stirred until dissolved.
3. Pour the urea solution into a silo containing straw.
4. Cover the surface with plastic silo neatly tied up completely airtight.
5. After one month of silo can be opened and straw is ripe.
6. Put the straw at the place which could be reached by the wind for 2 days before being given the cattle.

Good Ammoniation: it smells like urea (ammonia), soft structure, not containing fungi.

4. CONCLUSIONS

New program proposed here for enhancing the society welfare and for empowering the society in Indonesia is do needed. We find that in Madura as one of the rural areas in Indonesia do need to be enhanced. Through Ammoniation combined with Participatory Rural Appraisal, this program will be one of the best solutions for human empowerment and the development of rural area. We do hope that the rural region like Bangkalan, Madura will be improved. Ammoniation, Straw Fermentation and Concentrate Feed are several from many ways to enhance and empower rural society. As the government take care of them as the equalization of the society will be achieved. These three proposed ways are still on going in Bangkalan, Madura. From these methods, we do hope that the probability of the cattle quality enhancement is bigger. Through this quality enhancement it will be easier to Hopefully other regions which have the same region characteristics are able to apply these methods for the empowerment of rural society. In the next research we do hope that we can apply other methods for the enhancement of the society empowerment.

Acknowledgments: The researchers would like to acknowledge the financial support of the Ministry of Higher Education Research and Technology of the Republic of Indonesia.

References and Notes

1. G. Sharp, *Constutive Abstraction and Social Practice* 70, 48 **(1985)**.
2. M. T.-W. Sun, Y.-T. Tsai, M.-C.. Shih, and J. Y.-W. Lin, *Public Administration and Development* 29, 250 **(2009)**.
3. R. A. W. Rhodes, *Political Studies* XLIV, 652 **(1996)**.

4. T. Ahmed, M. A. Hashem, M. Khan, M. F. Rahman, and M. M. Hossain, *Bangladesh Journal of Animal Science* 39 **(2010)**.
5. D. M. Ruiz, L. P. Sempere, A. G. Martinez, J. J. R. Alcaide, J. O. Pamio, F. P. Blanco, and D. Garcia, *Agriculture System* 65, 179 **(2000)**.
6. E. Aloyo, *The Global Governance Institute* 1 **(2012)**.
7. Mandala, The Concept of Strategic Planning with the Planning Participation as Embodiment Poverty Disadvantaged Areas, National Development Planning Agency, Directorate of Special Areas of Disadvantaged Regions **(2011)**.
8. S. R. J. Sheppard and M. J. Meitner, *Forest Ecology and Management* 207, 171 **(2005)**.
9. B. Siebenhuner and V. Barth, *Environ. Impact Assess* 25, 367 **(2005)**.
10. D. J. Salter, C. Campbell, M. Journeay, and S. R. J. Sheppard, *Journal of Environmental Management* 90, 2090 **(2009)**.
11. P. Jankowski and T. Nyerges, *Annals of the American Association of Geographers* 91, 48 **(2001)**.
12. C. P. Wild, *Food and Nutrition Bulletin* 28, S372 **(2007)**.
13. C. P. Wild and Y. Y. Gong, *Carcinogenesis* 31, 71 **(2010)**.
14. F. Wu and G. P. Munkvold, *Journal of Agriculture and Food Chemistry* 56, 3900 **(2008)**.

Received: 20 August 2016. Accepted: 22 May 2017.